Patent claims

1. Method for producing a vertically emitting laser, in which a current aperture and a semiconductor relief are produced, the area size of the semiconductor relief and the area size of the current aperture being defined in the same production step.

2. Method according to claim 1, characterized in that the production step is carried out in such a way that the area size of the semiconductor relief and the area size of the current aperture comply with a predetermined size ratio in a self-scaling manner.

3. Method according to claim 2, characterized in that the area size of the semiconductor relief and the area size of the current aperture are defined in an oxidation step.

4. Method according to claim 3, characterized in that
- an oxidizable auxiliary layer for the definition of the area size of the semiconductor relief and an oxidizable current aperture layer are subjected to the oxidation step,
- the ratio between the oxidation rate of the oxidizable auxiliary layer and the oxidation rate of the current aperture layer defining the predetermined size ratio.

5. Method according to claim 4, characterized in that a mesa structure encompassing the oxidizable auxiliary layer and the current aperture layer is produced, and in that the sidewalls of the mesa structure are subjected to the oxidation step.

6. Method according to claim 5, characterized in that

- at least one semiconductor intermediate layer is arranged on the oxidizable current aperture layer of the laser,
- the oxidizable auxiliary layer is arranged on the semiconductor intermediate layer,
- a covering layer is arranged on the oxidizable auxiliary layer,
- the mesa structure is etched into the resulting layer stack, and
- the sidewalls of the mesa structure are subjected to the oxidation step, the oxidizable current aperture layer and into the oxidizable auxiliary layer being oxidized laterally during the oxidation step.

7. Method according to claim 6, characterized in that
- the oxidizable auxiliary layer is removed in its oxidized regions, a region of the semiconductor intermediate layer being uncovered,
- the semiconductor intermediate layer being etched in the uncovered region down to a depth corresponding to the depth of the semiconductor relief to be produced,
- the covering layer and the non-oxidized regions of the oxidizable auxiliary layer are removed, thereby uncovering the semiconductor relief in the semiconductor intermediate layer.

8. Method according to claim 7, characterized in that at least one mirror layer is arranged on the semiconductor relief.

9. Method according to claim 1, characterized in that the semiconductor relief is arranged between an upper mirror layer and a current aperture of the VCSEL laser.

10. Method according to claim 9, characterized in that the area size of the semiconductor relief is made

to be larger than the area size of the current aperture.

11. Method according to claim 2, characterized in that a layer made of dielectric material is used as the mirror layer.

12. Method according to claim 1, characterized in that
- a mesa structure and a current aperture are produced, and
- an upper electrical contact of the laser is arranged on the mesa structure,
- the arrangement of the upper electrical contact, of the current aperture and also of the semiconductor relief relative to one another being effected in a self-aligning manner.

13. Method according to claim 12, characterized in that an intra-cavity contact is formed as the upper electrical contact.

14. Method according to claim 13, characterized in that the intra-cavity contact is formed on the semiconductor intermediate layer.

15. Vertically emitting laser with a semiconductor relief for radiating undesirable modes, the semiconductor relief being arranged between an upper mirror layer and a current aperture of the laser.

16. Laser according to claim 15, characterized in that the area size of the semiconductor relief is larger than the area size of the current aperture.

17. Laser according to claim 15, characterized in that the mirror layer comprises dielectric material.

18. Laser according to claim 15, characterized in that the laser has an intra-cavity contact as the upper electrical contact.